

CREE

UTILITY-SCALE SILICON CARBIDE POWER TRANSISTORS

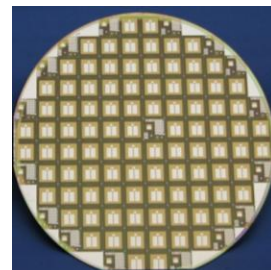
PROJECT TITLE:	15 kV/100 A SiC IGBT Power Modules For Grid-Scale Power Conversion		
ORGANIZATION:	Cree, Inc.	LOCATION:	Durham, NC
PROGRAM:	ADEPT	ARPA-E AWARD:	\$5,200,003
TECH TOPIC:	Electricity Transmission Distribution	PROJECT TERM:	9/1/10 - 8/31/13
WEBSITE:	www.cree.com		

CRITICAL NEED

All electric devices are built to operate with a certain type and amount of electrical energy, but this is often not the same type or amount of electrical energy that comes out of the outlet in your wall. Power converters modify electrical energy from the outlet to a useable current, voltage, and frequency for an electronic device. Power stations also use power converters on a larger scale to modify electrical energy so it can be efficiently transmitted. Today's power converters are inefficient because they are based on decades-old technologies and rely on expensive, bulky, and failure-prone components. Within the next 20 years, 80% of the electricity used in the U.S. will flow through these devices, so there is a critical need to improve their efficiency.

PROJECT INNOVATION + ADVANTAGES

Cree is developing silicon carbide (SiC) power transistors that are 50% more energy efficient than traditional transistors. Transistors act like a switch, controlling the electrical energy that flows through an electrical circuit. Most power transistors today use silicon semiconductors to conduct electricity. However, transistors with SiC semiconductors operate at much higher temperatures, as well as higher voltage and power levels than their silicon counterparts. SiC-based transistors are also smaller and require less cooling than those made with traditional silicon power technology. Cree's SiC transistors will enable electrical circuits to handle higher power levels more efficiently, and they will result in much smaller and lighter electrical devices and power converters. Cree, an established leader in SiC technology, has already released a commercially available SiC transistor that can operate at up to 1,200 volts. The company has also demonstrated a utility-scale SiC transistor that operates at up to 15,000 volts.



IMPACT

If successful, Cree would improve the energy efficiency of power transistors by 50% and help modernize the electric power grid.

- **SECURITY:** This project would contribute to a smarter, more advanced, and more reliable grid.
- **ENVIRONMENT:** This project could reduce up to 50% of the energy lost by power transistors, which would in turn reduce electricity consumption and harmful emissions.
- **ECONOMY:** Smaller and less expensive electrical systems would lead to lower power prices. The market for SiC power semiconductors could reach \$6 billion by 2016.
- **JOBS:** Widespread use of SiC power technology could create jobs in manufacturing and engineering.

CONTACTS

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